



September 8, 2017

**VIA ELECTRONIC FILING**

Ms. Marlene H. Dortch, Secretary  
Federal Communications Commission  
445 Twelfth Street, SW  
Washington, DC 20554

**Re: Ex Parte Presentation, Use of Spectrum Bands Above 24 GHz for Mobile Radio Services,** GN Docket No. 14-177; IB Docket No. 15-256; RM-11664; WT Docket No. 10-112; IB Docket No. 97-95.

Dear Ms. Dortch,

On September 6, 2017, Scott Bergmann and Kara Romagnino Graves of CTIA met with Daudeline Meme of the Office of Commissioner Mignon Clyburn, and on September 8, 2017, they met with Rachael Bender of the Office of Chairman Ajit Pai and, separately, with Kevin Holmes of the Office of Commissioner Brendan Carr, to discuss the above-captioned proceedings.

During the meetings, and consistent with the attached presentation, CTIA explained that the United States leads the world in the deployment and adoption of 4G wireless services and that next-generation 5G wireless services hold the promise of unlocking even greater benefits to consumers, businesses, and the U.S. economy by providing much faster speeds and enough bandwidth to support the Internet of Things.<sup>1</sup> CTIA noted that ever-increasing consumer use of 4G, and soon 5G, mobile broadband is placing tremendous demands on wireless providers, which must not only add spectrum

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<sup>1</sup> See *Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities*, Accenture Strategy (Jan. 2017), <https://www.ctia.org/docs/default-source/default-document-library/how-5g-can-help-municipalities-become-vibrant-smart-cities-accenture.pdf>; see also *Wireless Connectivity Fuels Industry Growth and Innovation in Energy, Health, Public Safety, and Transportation*, Deloitte and CTIA (Jan. 2017), [http://www.ctia.org/docs/default-source/default-document-library/deloitte\\_20170119.pdf](http://www.ctia.org/docs/default-source/default-document-library/deloitte_20170119.pdf).



capacity but must also expand the physical networks needed to accommodate that demand.

CTIA applauded the Commission for taking a critical first step in unlocking high-band spectrum to enable these benefits. In particular, we highlighted the careful balance the Commission created in the *Spectrum Frontiers Order* to allow for rapid and flexible deployment of 5G services in the 28 GHz and 37/39 GHz bands while also permitting use and expansion of satellite services. The licensing framework adopted for those bands was fully vetted and provides flexibility for Fixed Satellite Service (“FSS”) providers. The wireless industry is undergoing 5G trials and developing deployment plans based on the compromise framework established by the Commission. CTIA therefore urged the Commission to reject requests to revisit the licensing and technical framework or to impose additional limitations on terrestrial mobile deployment in these bands.

CTIA also discussed the recently filed Roadmap for High Band Spectrum (“Roadmap”), which was developed by CTIA and its members after close study of the existing spectrum allocations in the millimeter wave bands.<sup>2</sup> The Roadmap, which is detailed in the attached presentation, sets forth a path for the Commission to supplement the initial spectrum outlays in the 28 GHz and 37/39 GHz bands with additional spectrum for both terrestrial and satellite use, including significant blocks of spectrum to facilitate 5G mobile broadband networks and services. Importantly, it also provides a path for satellite interests seeking access to high band spectrum, in addition to that made available under the Commission’s flexible framework adopted in the *Spectrum Frontiers Order*. The Roadmap thus presents a balanced approach that will enable innovation for both terrestrial mobile wireless and satellite to the ultimate benefit of consumers

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<sup>2</sup> See Letter from Scott K. Bergmann, CTIA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al.* (filed July 14, 2017).



Pursuant to Section 1.1206 of the Commission's rules, a copy of this letter is being filed in ECFS and provided to the Commission participants. Please do not hesitate to contact the undersigned with any questions.

Sincerely,

/s/ Scott K. Bergmann

Scott K. Bergmann  
Vice President, Regulatory Affairs

Attachments

cc: Rachael Bender  
Daudeline Meme  
Kevin Holmes



# Spectrum Frontiers Roadmap



# 01 Positioning the U.S. to Win the Global Race for 5G Leadership



# The Wireless Industry Powers Our Economy

CREATING NEW AMERICAN JOBS AND OPPORTUNITIES



The wireless industry adds \$400B annually to our economy.



The Brattle Group

MAY 2015

4.6 M  
JOBS

American jobs rely directly or indirectly on the wireless industry.

JOB  
MULTIPLIER

6.5 jobs are created every time the wireless industry employs **one** person.

44%  
MORE PAY

Wireless jobs pay better than the average job.

# 5G Opportunity

ACCENTURE FORECASTS JOBS AND GROWTH



**\$275 BILLION**

New Wireless Investment



**3 MILLION**

New Jobs



**\$500 BILLION**

Contribution to GDP

# 5G Global Race

## KEYS FOR U.S. LEADERSHIP

**SOUTH KOREA** has announced 5G trials at the 2018 Winter Olympics

**JAPAN** plans to have 5G at the 2020 Summer Olympics in Tokyo

**CHINA** starting buildout in major cities in 2018; full commercial deployment by 2020

**THE EUROPEAN UNION** has committed 700M Euros to 5G R&D





# 02 CTIA High Band Spectrum Roadmap

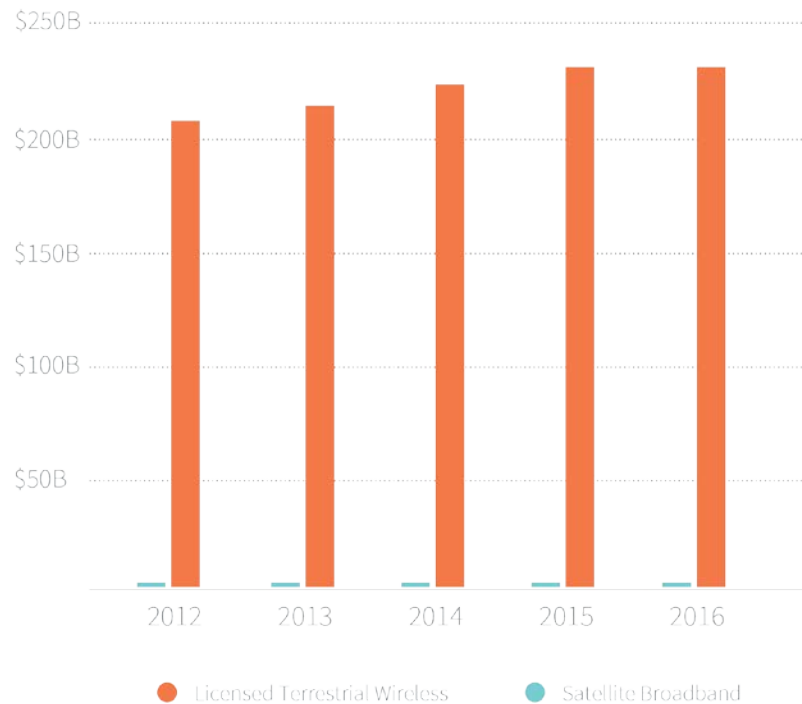
# High Band Roadmap Takeaway

## THE GOALS

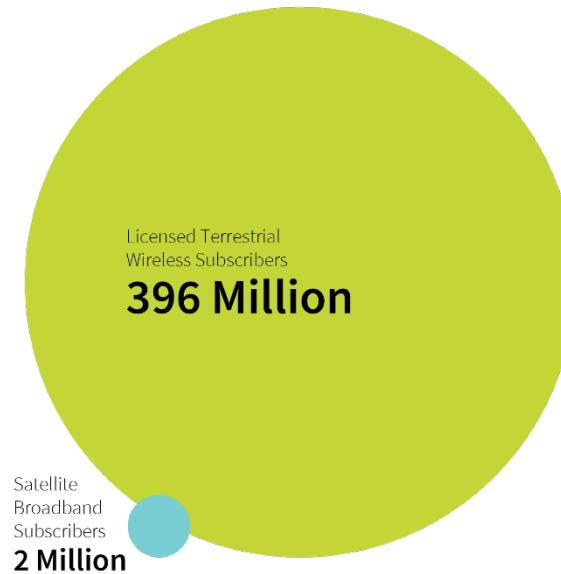
- Maintain balanced sharing framework adopted in 2016 Spectrum Frontiers Order
- At least 15 gigahertz of additional spectrum
- In large contiguous blocks
- For licensed terrestrial mobile broadband



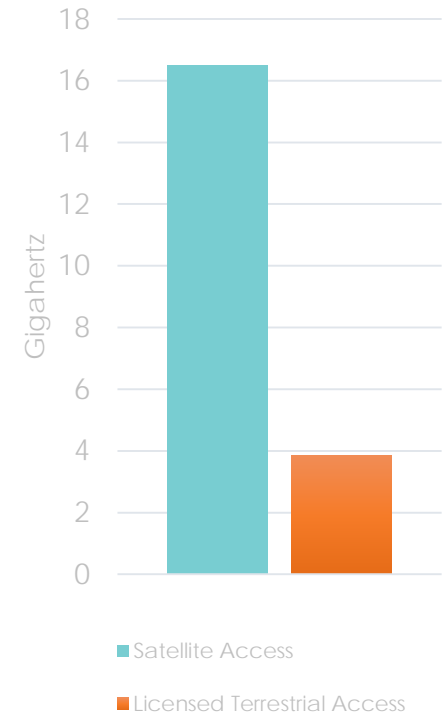
# Terrestrial and Satellite: Side by Side



REVENUE



SUBSCRIBERS

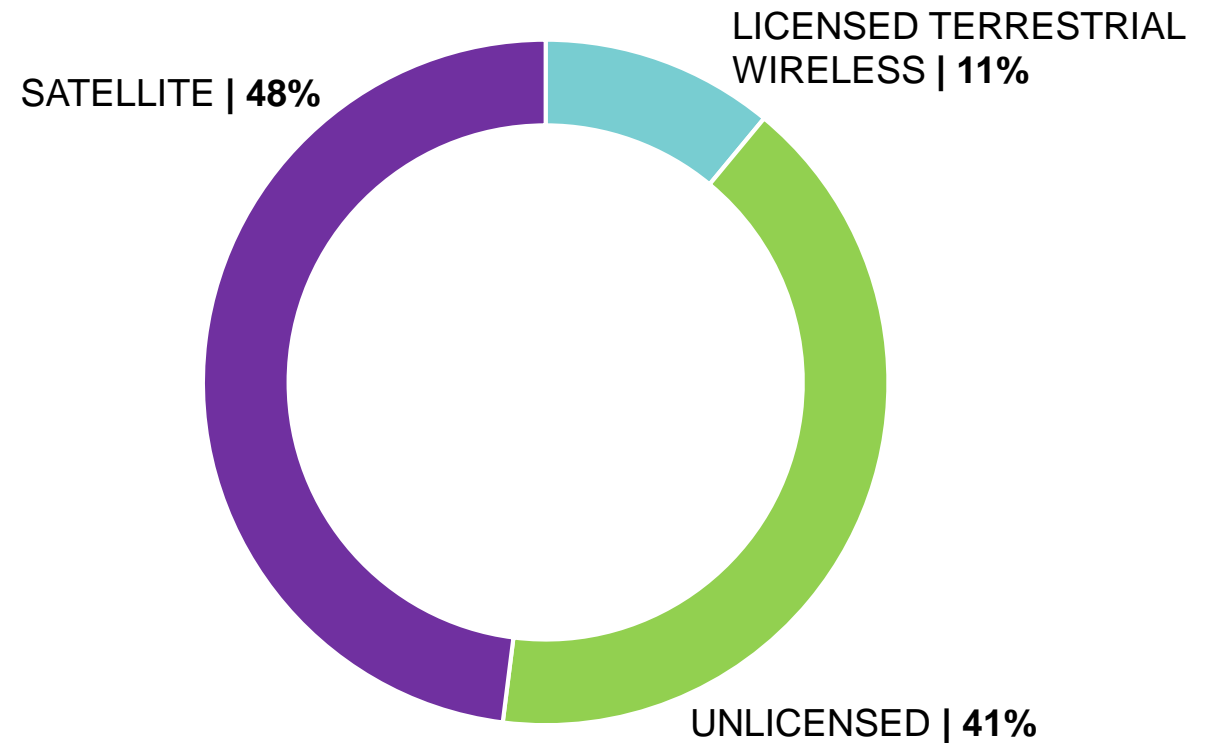


SPECTRUM

# High Band Roadmap Takeaway

## THE GOALS

- Licensed terrestrial use is key to our global wireless leadership
- Satellite has access to 4 times more high band spectrum than terrestrial mobile
- Unlicensed has access to 3 times more high band spectrum than licensed



# High Band Roadmap

## BUILDING BLOCKS FOR 5G

### REALIZE THE PROMISE OF THE SPECTRUM FRONTIERS ORDER

- Retain the balanced framework for terrestrial and satellite providers
- Create an investment-friendly licensing scheme for the 37-37.6 GHz band
- Bring these bands to auction by 2018

### DELIVER SIGNIFICANT ADDITIONAL SPECTRUM TO FACILITATE 5G

- Harness bands identified by the FCC and internationally
- Create large contiguous and complementary blocks of spectrum

### LEVERAGE ECONOMIES OF SCALE

- Harness the rapidly developing equipment market
- Enable use of an integrated radio across multiple bands
- Enable efficient use of spectrum

# High Band Roadmap

## BALANCED APPROACH

### CREATE A MORE EQUITABLE ALLOCATION OF HIGH BAND SPECTRUM

- Satellite Allocation: 19.75 GHz
- Terrestrial Allocation: 19.55 GHz
- Unlicensed: 14 GHz

### AFFORD SATELLITES EXTENSIVE ACCESS TO HIGH BAND SPECTRUM

- Exclusive use of 40-42 GHz and 81-86 GHz
- Shared use of other Spectrum Frontiers bands under Part 30 rules

### PROVIDE SIGNIFICANT OPPORTUNITIES FOR SATELLITE USE

- Access to interference-protected spectrum through auctions and non-auction mechanisms
- Able to compete with terrestrial wireless services
- Able to offer service, including to rural areas



# 03 Finishing the Job on the FCC's 2016 Order

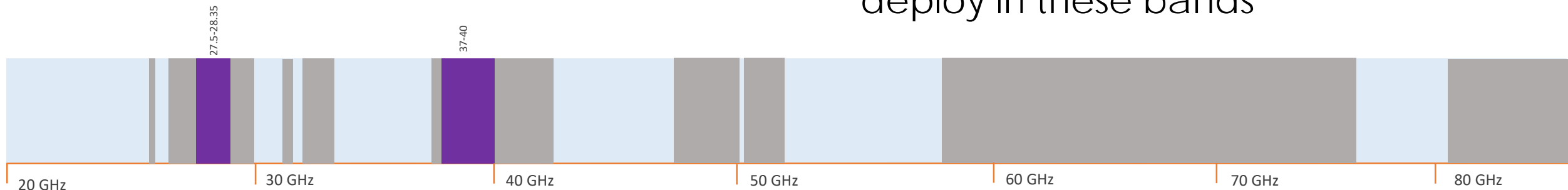
# Bands: 28 GHz / 37-40 GHz

## THE GOAL

- Auction 27.5-28.35 GHz and 37-40 GHz bands by no later than December 31, 2018

## THE RATIONALE

- Key bands for initial 5G deployment
- Existing licenses cover 75% of population
- Wireless companies actively undergoing trials and moving to deploy in these bands



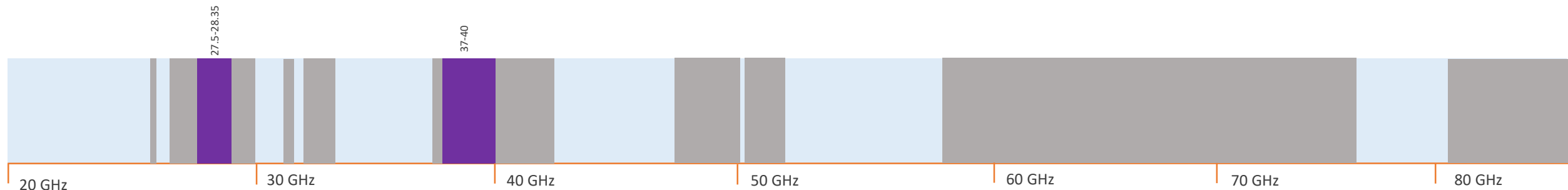
# Bands: 28 GHz / 37-40 GHz

REJECT SUGGESTIONS TO MODIFY THE LICENSING FRAMEWORK

Limits on new satellite earth stations were fully vetted and provide flexibility for FSS providers

Requests by the satellite industry for protection from aggregate interference were properly rejected

Limits on terrestrial deployments would artificially limit the flexibility needed to provide mobile broadband services



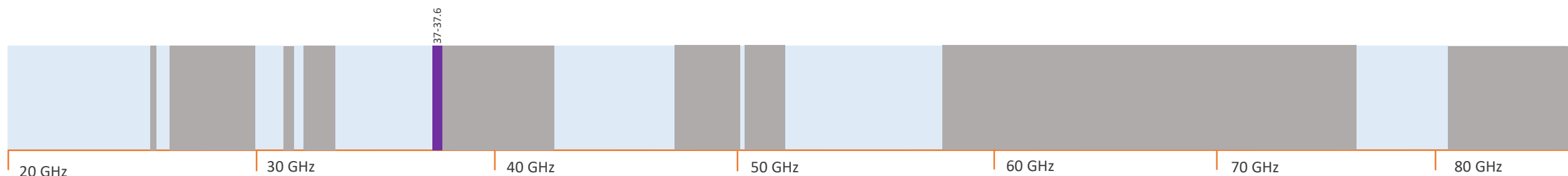
# Band: 37-37.6 GHz

## THE GOAL

- Modify 37-37.6 GHz licensing scheme to allow for exclusive use with coordinated sharing solely between federal and non-federal users

## THE RATIONALE

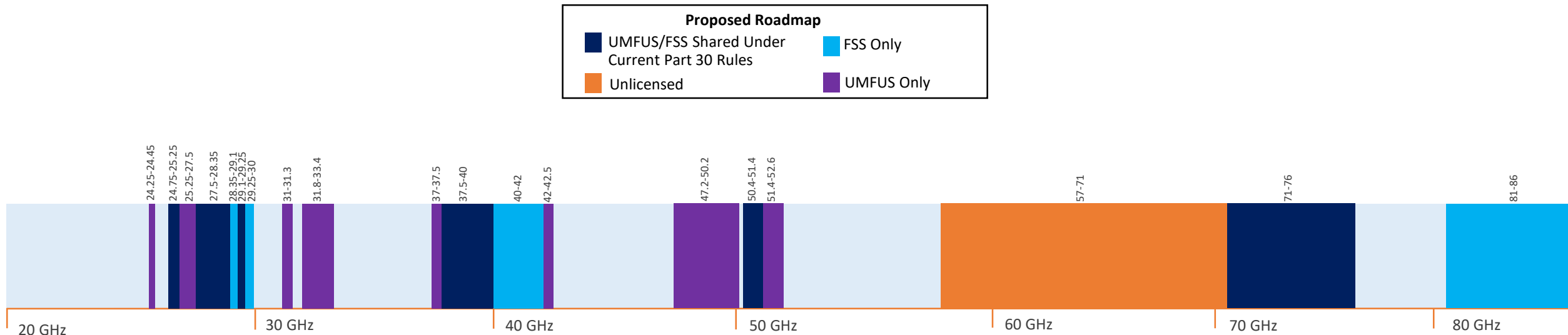
- Contiguous band = more value at auction
- Greenfield spectrum presents a number of opportunities
- Balances sharing and exclusive use



# 04 Roadmap for American Leadership in 5G



# Spectrum Frontiers Roadmap





# Contiguous Blocks of Spectrum

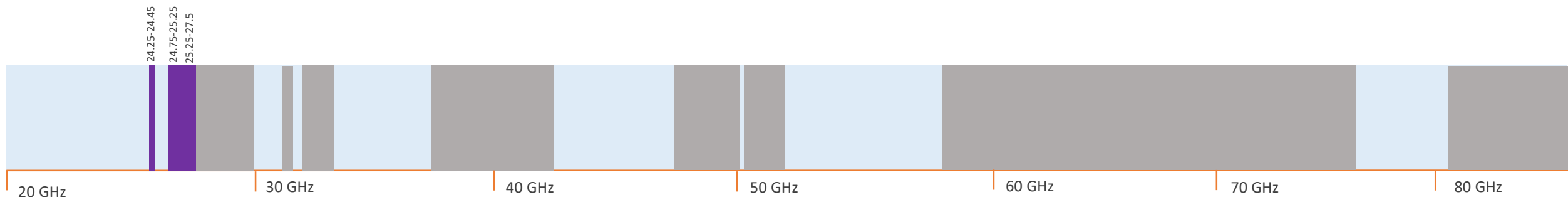
## 24-28 GHz BAND

### THE GOAL

- Along with 28 GHz, creates a 4 gigahertz nearly contiguous block for licensed terrestrial mobile use in the 24 GHz (24.25-24.45 GHz, 24.75-25.25 GHz) and 26 GHz (25.25-27.5 GHz) bands

### THE RATIONALE

- 24 GHz band has existing terrestrial mobile allocation
- Adding 26 GHz has support in the record and internationally, and can help grow 28 GHz band that wireless carriers are already aggressively exploring for 5G



# Contiguous Blocks of Spectrum

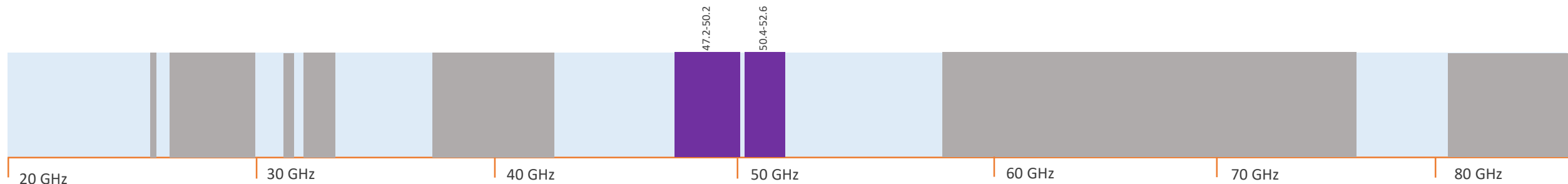
47 & 50 GHz BAND

## THE GOAL

- Create 5-gigahertz nearly contiguous block by allowing terrestrial licensed use of 47.2-50.2 and 50.4-52.6 GHz bands

## THE RATIONALE

- Bands being studied internationally for mobile use
- Enable satellite deployment by allowing satellite feeder links in 50.4-51.4 GHz portion on a non-interfering basis



# Complementary Blocks of Spectrum

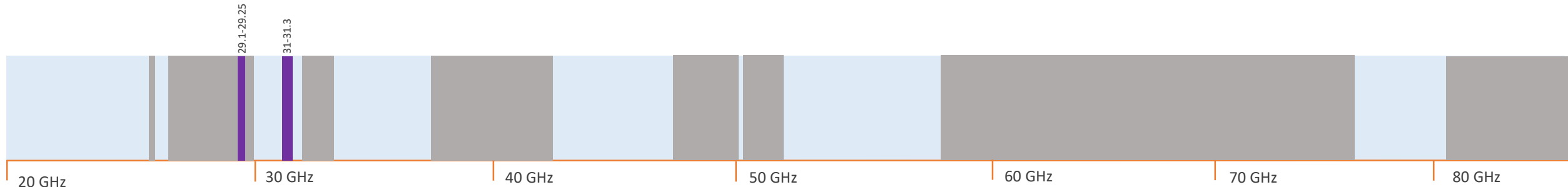
## 29 & 31 GHz BANDS

### THE GOAL

- Allow mobile broadband in 29.1-29.25 GHz and 31-31.3 GHz bands under rules consistent with other LMDS bands

### THE RATIONALE

- Leverages economies of scale and enables efficient spectrum use



# Complementary Blocks of Spectrum

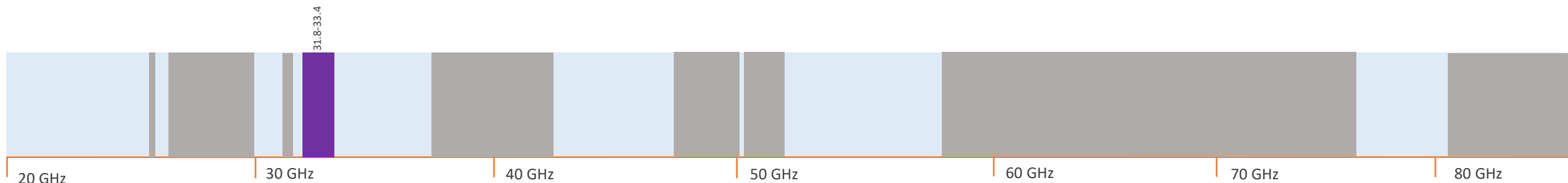
32 GHz BAND

## THE GOAL

- Allow terrestrial licensed, exclusive use of 31.8-33.4 GHz band by adding a primary, non-federal, fixed and mobile allocations
- Protect radio astronomy use

## THE RATIONALE

- Possible global harmonization (WRC-15 study item; potential WRC-19 mobile allocation)
- Strong record support for allocating this valuable, underused band



# Complementary Blocks of Spectrum

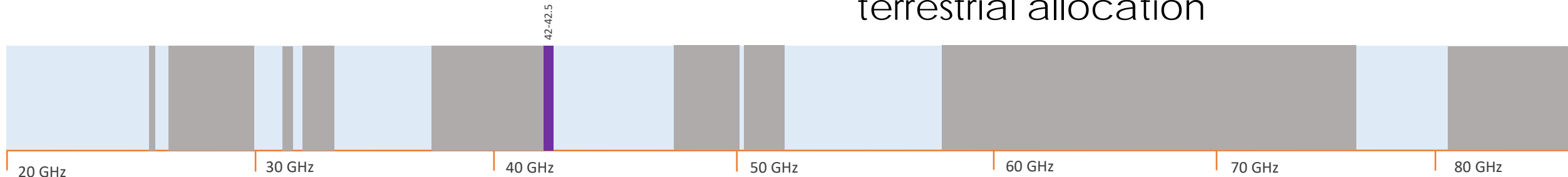
## 42 GHz BAND

### THE GOAL

- Allow terrestrial licensed, fixed and mobile use of 42-42.5 GHz band

### THE RATIONALE

- Along with the 37-40 GHz band, creates 3.5 gigahertz of spectrum that can be accommodated into a single radio
- Being studied internationally for 5G and has primary fixed and mobile terrestrial allocation



# Balanced Approach

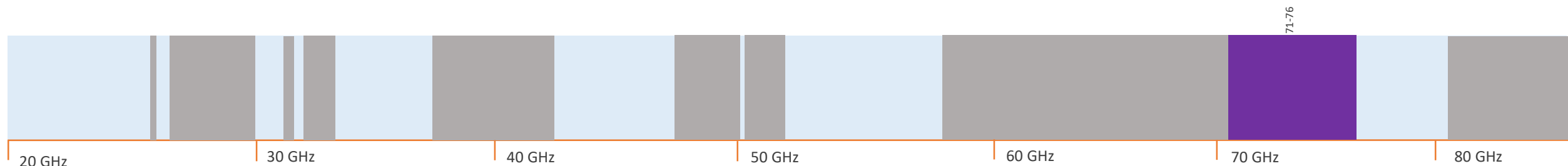
70 GHz BAND

## THE GOAL

- Allow shared access to 71-76 GHz for terrestrial licensed and FSS use under existing Part 30 rules

## THE RATIONALE

- Existing primary allocations for both terrestrial (mobile and fixed) and FSS
- Provides additional 5 gigahertz for contiguous spectrum for mobile broadband and supplementary FSS downlink spectrum





# Exclusive Satellite Access

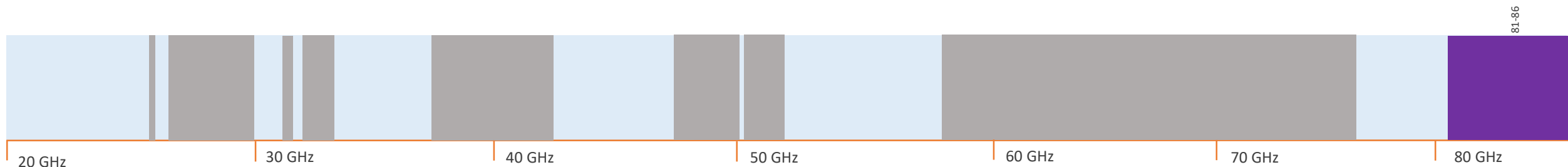
80 GHz BAND

## THE GOAL

- Explore the 81-86 GHz band for exclusive use for satellite uplinks
- Grandfather existing terrestrial uses

## THE RATIONALE

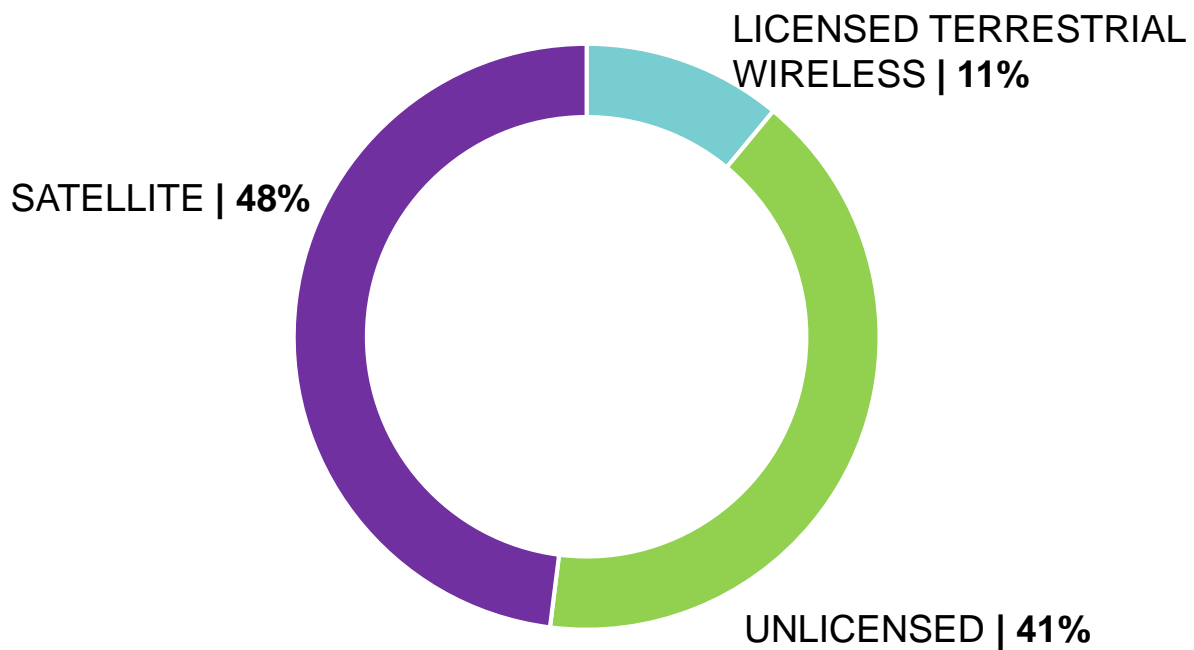
- Provides exclusive spectrum for satellite uplinks in an existing FSS allocation
- Has existing database for sharing with grandfathered terrestrial operations
- Path loss similar to 50 GHz band and should be optimal for small user earth station antennas



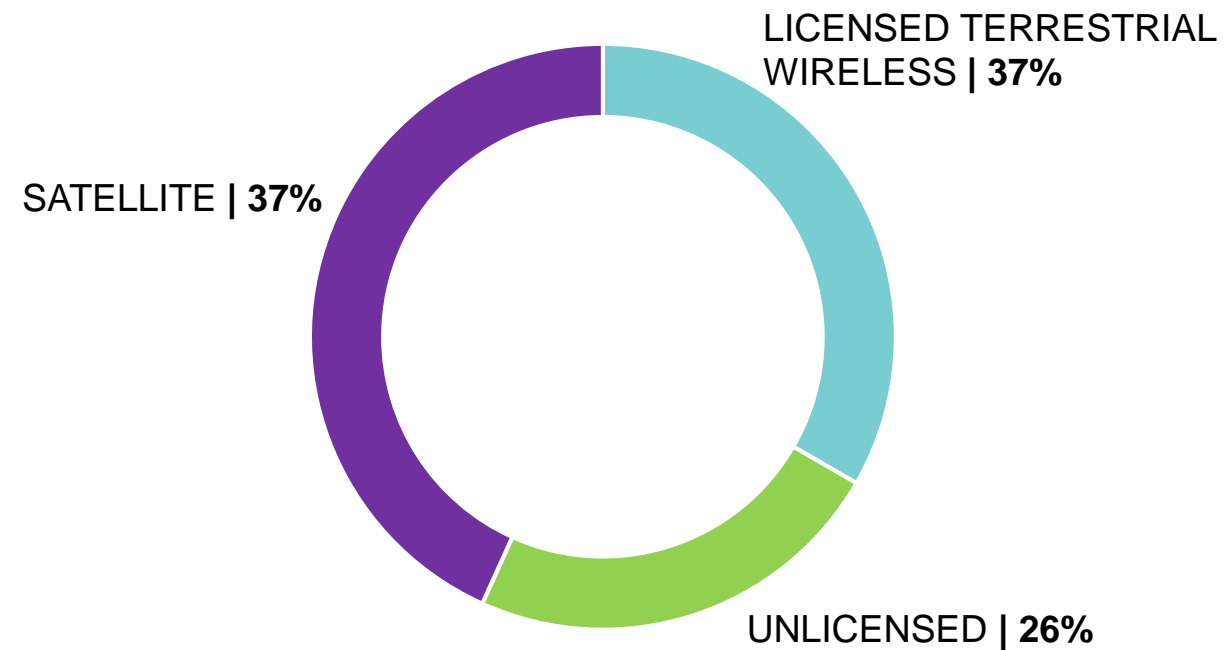
# 05 A Balanced Approach Benefiting All Stakeholders

# High Band Roadmap Takeaway

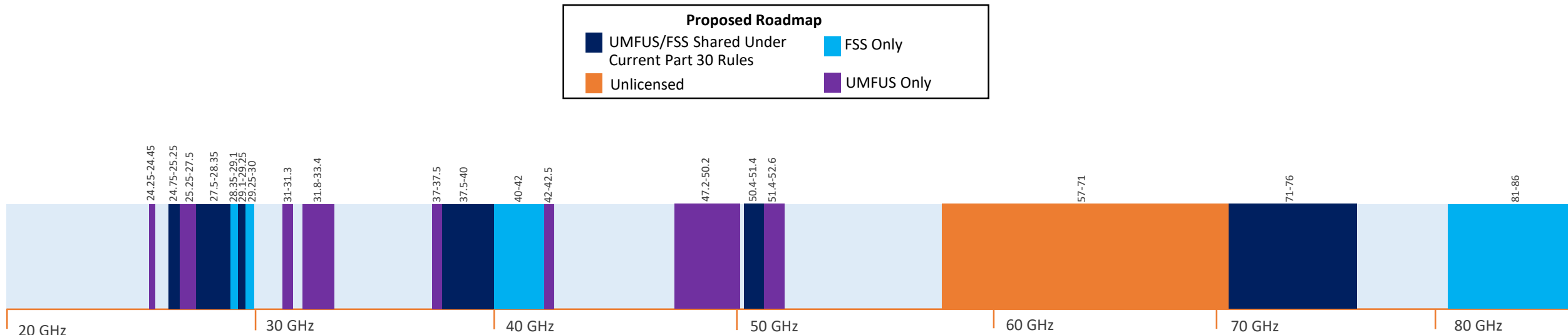
**CURRENT HIGH BAND DISTRIBUTION**



**PROPOSED HIGH BAND DISTRIBUTION**



# Spectrum Frontiers Roadmap



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